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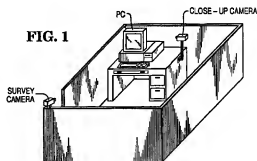
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(54) **Virtual conferencing system.**

(57) A remote conferencing system includes a host computer and a plurality of local computers connected to the host computer by local area networks and/or wide area networks, for example. The host computer is adapted to generate a common image for display by the local computers, users of the local computers being able to modify the common image. The host computer also controls an invitation system whereby a requester can invite participants to a conference by utilizing images of a hallway containing the doors of the rooms of potential invitees. Each room contains a local computer, a close-up camera and a survey camera.



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This invention relates to remote conferencing systems.

Systems are presently available wherein two persons can both see and speak with each other at a distance.

The article "Multimedia Desktop Conferencing System: MERMAID" by K Watabe et al, in NEC Research and Development, vol 32 No. 1, January 1991, pages 158-167, describes a distributed multimedia desktop conferencing system wherein shared windows are shared by all the participants to a conference and modifications made by a floor-holder are transmitted to all the participants at almost the same time.

According to the present invention, there is provided a remote conferencing system, including a plurality of local computers, characterized by a host computer adapted to generate a common image for display by said local computers, and to allow users of the local computers to modify said common image.

It will be appreciated employment of a host computer which generates a common image facilitates the exchange of information among the local computers.

An example will illustrate one form of the invention. Two (or more) parties each operate their own local computers. The computers have associated video cameras, speaker-type telephones, and pointing devices (such as "mice"). When a conference is established, the local computers become connected to a host computer, via commercially available Local Area Networks (LANs) and Wide Area Networks (WANs).

The parties send the information which they want displayed, such as drawings, to the host computer. The host computer generates a common video screen, which it distributes to the parties: they see the drawings at their own local computers. Each party can move a pointer on the display, and point to features on the drawings. The telephones and video cameras allow the parties to see and speak with each other.

The host controls many of the events occurring during the conference, as well as those occurring both during initiation of the conference and after termination of the proceedings.

-- For example, the host provides a system which allows a person to invite participants to the conference in a convenient manner, including some automated invitation features which will be described later.

-- As another example, the host provides some unique stenographic- and recording features.

-- As yet another example, the host can maintain the virtual conference room in existence after the conference terminates, so that the records of the proceedings remain available for persons who wish to examine them.

## BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates equipment which enables a person to remotely attend a virtual conference.

Figure 2 illustrates computer displays showing menu choices which allow a user to initiate a virtual conference.

Figure 3 illustrate further menu choices.

Figures 4, 5, and 6 illustrate a type of "telephone directory," in which the persons listed are not listed alphabetically, but are listed by geographic location.

Figure 7 illustrates a computer display showing a virtual hallway. Behind each door is a person's office. Each office contains the equipment shown in Figure 1. The person viewing the hallway can look into each office (if allowed to do so) via a connection made with the cameras shown in Figure 1.

Figure 8 shows key-icons which can be used to gain entry to a virtual conference which is not open to the general public.

Figure 9 shows one type of video screen which is generated by the host computer, and which is distributed to all participants in the conference.

Figure 10 shows a screen, of the type given in Figure 9, but further including a "Document to be Placed on Table," which was transmitted to the host by a participant, and which the participant will show to the other participants by placing it onto the "conference table."

Figure 11 shows the sequence of events by which the "Document . . ." of Figure 10 will become displayed.

Figures 12 and 14 illustrates display screens which can appear when one participant passes a note to another.

Figure 13 illustrates one display screen which can appear when one participant "whispers" to another.

Figures 15 to 22B provide flow charts illustrating the operation of the conferencing system.

In the described system, the participants share a common virtual conference table. Each participant can

- (1) place a document onto the table electronically,
- (2) write on the document, draw on it, and otherwise manipulate it, and
- (3) move a pointer to different positions on the document, to point to specific parts of it.

All other participants see the the preceding three events as they occur.

The system further provides the following features:

-- The participants can privately whisper or pass notes to each other, without the knowledge of the others.

-- A person wishing to invite participants to a conference can "walk a hallway" shown on that person's computer display. Doors shown in the

hallway are virtual doors, through which the person can look into offices of invitees, via a video camera system.

- The invitation process itself can be viewed as a conference between two parties, namely, the inviting person and the person (or office generally) behind the door with which the inviting person is communicating at that time.

Every office is equipped with the following equipment:

- a computer (termed a "local computer" herein), one or two video cameras, and

- a telephone having "speaker-phone" capability. One office is shown in Figure 1.

One of the video cameras (a "survey camera") surveys the entire office from a point near the door, as though the camera were looking into the office. The second camera (a "close-up" camera) is located next to the computer, and provides a close-up view of the computer user. The second camera gives the "computer's view" of the user.

One of the cameras can serve a second purpose: it can be used as an optical scanner, for capturing images of documents and drawings. The computer is equipped with a frame grabber for converting the image seen by the camera into a bit-mapped file. Alternately, an optical scanner can be used for capturing these images.

These individual systems are located at different geographic locations, and, when a virtual conference is to be held, become connected to a central, host, computer (or multiplicity of host computers) via the proper combination of Local Area Networks (LANs) and Wide Area Networks (WANs).

A person requesting a conference informs the host computer by appropriate means. For example, the Requester can "click" a pointing device onto a "conference icon," such as that shown in Figure 2, on his display screen. In response, his local computer sends the proper signal to the host. Now, the host must be given several items of information, which can, for convenience, be divided into two groups.

One group relates to the participants:

- Who are the participants?
- Can others participate without invitations?
- Can participants send substitutes?

The second group relates to the conference room:

- Where does it exist? That is, where does the data structure reside from which the conference room is constructed. The location must be known to a participant who wishes to find the conference room.
- What are the room attributes?
  - What is the room decor? What paintings are on the walls?
  - What equipment is present in the room? For example, the host computer may provide

the option for any participant to record the entire proceedings of a conference, or any selected part of the proceedings. This option may be represented by an icon in the shape of a tape recorder, which is contained in the conference display screen. Similar options can be present in the form of icons in the shape of telephones, notepads, library books, tables, etc.

The third relates to conference procedures:

- What rules govern the conduct of the meeting?
- Does the Requester have absolute control of the voice and message interaction among the participants? Or
- Is the meeting a brainstorming free-for-all, where numerous people can speak at once?
- What is the decor of the room?
- What happens to the room when the conference is adjourned? Are minutes of the conference kept?

These issues will be considered in detail.

The Requester's local computer gathers the information indicated by the menu shown in Figure 2.

The Requester may have previously prepared a list of participants. If the list takes the form of a data file, he (or she) can send it to the host computer directly. If not, he can convert the list into a data file and send the data file to the host in several ways.

One, he can type the list into his own local computer, thereby generating a data file.

Two, he can show the physical, printed list to a digitizing device, which generates the data file. One such digitizing device is an optical scanner, which generates a bit-mapped image. The scanner sends the bit-mapped image to the Requester's local computer, which contains Optical Character Recognition (OCR) software. The OCR software translates the bit-mapped image into a data file written in ASCII code, which is sent to the host.

Another digitizing device is the close-up video camera, if equipped with the proper lens. The local computer contains a frame-grabber, which captures a bit-mapped image of the list, and sends it to the OCR software as above.

Once the host obtains the list, the host sends an invitation to each invitee, telling the date, time, place, subject, and any other relevant information about the meeting. One way to send the invitations is by electronic mail, which is known in the art. A second way is for the host to leave an "invitation card," such as that shown in Figure 3, on the screen of each local computer. Such cards are later discussed.

If the requester has no list, the host can give the option of picking names from a directory of names, akin to a "telephone directory." Another possibility is for the host to present the "telephone directory" in a more graphical format, such as the following.

The following invitation procedure can also serve as an actual conference, but held between the inviting person and the person invited. After the inviting person successfully establishes communication with the invitee, the inviting person, if desired, can order the host computer to provide an entire conference room, or selected equipment from the room, such as a recorder, for the convenience of the two parties. Further, the two parties, during their conference, can "walk the halls," and invite other participants, thereby expanding the conference to include additional participants.

Assume that the Requester wishes to invite fellow employees to the conference. The host computer first displays a map of all locations of facilities of the company, such as in Figure 4. The Requester picks a state. The host displays the state, showing all company facilities, as in Figure 5. The Requester picks a facility. The host shows the facility, in exploded form, as in Figure 6.

Now the Requester can "walk the halls." The host shows an image of a hallway, as in Figure 7. Each door bears a name. The Requester scrolls along the hallway, until he reaches an invitee's door. The door can be open, closed, or ajar. The status of the door is under the control of the person occupying the office in question, via that person's local computer.

If the office occupant does not wish to be interrupted by other people, the occupant instructs the conferencing system to close the door. Under such an instruction, the conferencing system shows a closed door to all Requesters who are "walking the hallway." In a similar way, the occupant controls whether the door is fully open or ajar.

If the door is open, then the Requester sees the image which the survey camera sees of that person's office. That is, the Requester can look into the Invitee-Occupant's office.

If the door is ajar, the Requester is given the option of "peeking" into the office. That is, the Requester is given momentary access to the survey camera, for a period such as five seconds.

Once the Requester has located the Invitee's office, the Requester must gain the attention of the Invitee. (The reader is reminded that the Requester is not physically present at the Invitee's office door; the Requester is "virtually present." The Requester is physically present at a computer present in another office. The computer is linked to the survey camera located at the Invitee's office.)

One option is to allow the Requester to instruct the host computer to place a small picture of the Requester onto the Invitee's computer display. The picture beckons the Invitee's attention. This procedure is somewhat analogous to real life: in real life, the Requester can pop his head into the Invitee's office and announce the conference.

The image placed onto the Invitee's screen is that

seen by the Requester's close-up camera, and occupies a small portion of the invitee's display. The Invitee has the option of blocking such beckoning, by instructing the host computer to block such interruptions.

If the Invitee wishes to respond to the Requester, the Invitee clicks a pointing device onto the picture, and the host establishes video and audio connections between the two local computers.

Another option is to allow the Requester to "knock" on the invitee's "door." In this case, the Requester instructs the host to cause the Invitee's computer to issue a knocking (or chiming) sound. When the Invitee responds, the host establishes the video and audio connection, as above. As above, the occupant can instruct the system to block all interruptions, including "knocking."

The Requester tells the Invitee of the upcoming meeting. The Requester proceeds to the doors of the other invitees, and repeats the process.

It is possible that the Invitee must decline the invitation to attend the conference. In such a case, the host should not connect the Invitee when conference time arrives. To ascertain whether the Invitee should be connected, the host asks the Requester which Invitees should be connected.

This inquiry can be made as the Requester leaves the office of each Invitee, while "walking the halls." For each Invitee who will attend, the host creates an "invitation card" (ie, an icon) and leaves it on the display of the Invitee, as a reminder of the conference, as shown in Figure 3.

The invitation card is an active icon, which provides access for issuing commands to the host. For example, when the Invitee clicks the pointing device onto the icon, the local computer presents a screen which displays information about the conference, such as date, time, and so forth, as shown in Figure 3. This display is preferably a window which can be shrunk to a convenient size, and left on the screen by the Invitee to serve as a notice announcing the meeting.

The meeting notice can be useful for a local computer which is located in a conference room, instead of an office, and which is used by several Invitees at once during the conference. That is, the notice constantly advertises information about the upcoming conference, somewhat as a "reserved" sign does for a physical conference room.

The invitation card icon provides access to other options, as will be explained below.

At this time, the host knows the identities of the invitees. Several additional details must be resolved before the meeting begins.

It is possible that, after an Invitee has accepted an invitation, something may prevent the Invitee from attending the forthcoming conference. That is, the Invitee will be an Absentee. Ordinarily, this would create

a small problem: the host computer is planning to connect the Absentee's local computer with the others for the conference, but the Absentee will be not be present. If the Requester has allowed Invitees to appoint Delegates to attend in their places, the Invitee may appoint one, in the following ways. (The menu used for this purpose is shown in Figure 2.)

The Absentee can click onto the invitation card left on the display, and obtain access to the host computer. The host computer then presents several options to the Absentee. The Absentee can designate a Delegate, and assign to the host the task of transmitting an invitation to the Delegate.

Alternately, the Absentee himself informs the Delegate of the new appointment to attend the meeting in customary ways, such as by telephone.

The Delegate can attend the meeting at several locations. For example, the Delegate can use the Absentee's office. This can be preferable, because it does not disrupt the host computer's connection scheduling.

Alternately, the Delegate can use his own office. In this case, the host computer must be notified, so that the host can connect to the Delegate's office. The Absentee performs the notification by clicking on the invitation card, which causes the host to provide a menu of options to the Absentee. The Absentee instructs the host to substitute the Delegate for the Absentee.

Another alternate is required if the Requester has imposed the requirement that the meeting be confidential, or other restrictions on access, as will be explained later.

At the time when the Requester imposed confidentiality, the host computer asked whether Invitees may send Delegates. If the answer was "Yes," then the Requester is prompted by the host to give the Absentee-Invitee a "key," which enables access to the meeting.

For example, the key is, essentially, a block of data, or a code. The Requester can leave the key in his local computer, in the form of an icon residing on the display, as shown in Figure 8. Anyone entering the office can use the key.

Alternately, the "key" icon is contained within a "vault" icon, as shown in Figure 8. Now, a user must use a "combination" to the "vault" to obtain the "key." In this latter example, the "combination" (ie, a pass-code) is obtained from the Absentee-Invitee in some appropriate way. At conference time, the Delegate opens the "vault," obtains the "key," and enters the conference room, by using the key.

This procedure is analogous to real life: the Absentee can leave the key to the conference room on his desk. Or the Absentee can hide the key, or leave it in a locked drawer.

If the Delegate wishes to attend the conference at his or her own office, the "key" can be passed to

the Delegate via the LAN-WAN network set up by the host. That is, as shown in Figure 3, one of the options on the invitation icon is to pass the key to a Delegate. The host transfers the key, and any necessary information, to the Delegate.

Several levels of confidentiality are possible. For example, the Requester can instruct the host to restrict access solely to the Invitees' computers, and to disallow "key-passing," which would enable other computers to link to the conference.

As another example, the Requester can state that "Spectators" can observe the conference. That is, any person can contact the host, obtain a list of ongoing conferences, select a conference room, enter it, and observe the proceedings.

As a third example, the Spectators can participate in the meeting. In such a case, they become "Walk-in-Invitees." The procedures applicable to Invitees apply to them.

Once these preliminary matters are established, the host creates the conference room. The host does this by creating a common image, such as that shown in Figure 9. The common image includes a picture of each invitee, a "table," and the room decor.

The pictures of the Invitees can be the actual images seen by the each invitee's close-up camera, or can be a photograph taken from the host's memory. In some situations, the photograph may be more convenient.

The pictures are initially grayed-out, meaning that they are either not presented in full contrast, or not in full color. Each will be given full color and contrast when the respective invitee arrives at the conference.

When time for the conference has arrived, the host computer takes roll of the participants as each arrives. While the early arrivals are waiting, the host computer provides them the options of playing games, listening to music, or seeing news or wire services, as indicated.

The host can remind the arrivals of the upcoming meeting at various intervals, such as five minutes, two minutes, one minute, thirty seconds, by sending a message to their computers.

When all participants have arrived, the meeting begins.

The table is a common display area which is shown to, and available for work by, each Invitee. That is, the image sent to each Invitee's display is a common image generated by the host. But each Invitee can modify the image, because the host receives input from each Invitee, and modifies the image in response. Some of the modifications are the following:

**Pointers.** Each Invitee has a pointing device (or, alternately, a keyboard which can move a cursor). Each local computer transmits its cursor position to the host. The host positions each Invitee's cursor on the table, as appropriate. With this cursor positioning,

each participant can point to items which he or she verbally discusses, using the audio link.

**Placing document on table.** Each Invitee can transmit a file (of any suitable kind: data, text, or graphic) to the host, and the host will place the file onto the table, where all participants can see it.

To place a document on the table, an Invitee performs a "drag-and-drop." That is, the invitee shrinks the window of the conference room to the size shown in Figure 10. The private work area outside the window displays the icons representing the invitee's programs and data files. The Invitee drags an icon onto the table, as shown in Figure 11, and double-clicks (or actuates) the icon. The icon blooms into an image dictated by the type of file which the icon represents (graphic, text, etc.)

**Modifying document.** Each Invitee can write on the document, using a "paint" - type program and a pointing device. Each Invitee can stretch or shrink the document, as allowed by the "Paint" program.

**Pull-down sheets/"writing on the walls".** The conference table contains a "notepad." Any Invitee can pull down a note sheet, as shown in Figure 12, by using the pointing device, and write on the sheet. (Of course, the Invitee could write directly on the table, but the table may be covered with documents. The pull-down sheets cover whatever is on the table, and provide a clean writing surface. A subsequently pulled-down sheet would cover a previous pulled-down sheet.)

The pull-down sheets can be enlarged at any time, to provide a larger writing surface, and can be placed at any location in the conference room, including the floors and walls.

The pull-down sheets can be opaque or transparent. Further, the host can be instructed to associate each sheet with the document onto which it was placed, so that, at a later time, the sheet can be associated with the document, in order to see the notes which were written on the document. In this way, the participants can, in effect, "mark up" the documents on the table, without actually defacing the documents.

The Requester is given several options of recording the conference. One option is a recording, in real-time, of all events and discussions occurring during the conference. This can be done by recording the sequence of images occurring on the common screen, together with the audio information.

Another option is to record only upon demand, and to record only the demanded material (ie, either the common screen, or the audio, or both.) For example, when a given document is placed onto the table, the Requester can order the host computer to record the screen, and to record all subsequent conversations, until the Requester terminates recording. In addition, participants can order their own recordings of selected time intervals. One approach is for the host to record all proceedings in their entirety. Meanwhile,

the host listens for recording requests from the participants. When a request is received, the host records start- and finish markers, which identify the recorded material requested by the participant.

Another option is for the host to sense the placement of a document onto the table. The host then asks whether the screen should be recorded. The inquiry can be made by a pulsing sign on the Requester's screen, such as "RECORD ?" If no answer is received within a predetermined time, such as three seconds, the host does nothing.

A third option is for the host to be equipped with voice recognition equipment, which can be quite elementary. A predetermined, unusual, speech pattern, such as "record this now" prompts the host to record the screen, together with ensuing conversation, until the host receives a second unusual speech pattern, such as "stop recording now."

The reason for using unusual speech patterns is that elementary speech recognition equipment can recognize such patterns more easily, and will not confuse common sayings with the unusual patterns.

The Requester is given the options of whether to save any recorded proceedings, which to save, and which to erase.

The overall operation of the described system is illustrated in Figs 15 to 22B. However, certain features are emphasized in the following eleven numbered paragraphs.

**1. Whispering.** Any participant can whisper to another, without being heard by others. For example, one party can click onto the picture of another. The picture becomes grayed, or otherwise different from the others, as shown in Figure 13. In addition, a prominent message is displayed on both parties' displays, such as "Whisper Mode is Active."

At this time, the host makes an audio connection between the two whispering parties, and between nobody else. The parties can communicate, until they terminate whisper mode.

**2. Note-Passing.** Parties can pass notes. One person can write a note, on the enlarged "NOTE" in Figure 13, and drag it to the picture of another party. When the other party sees the note on his picture, as in Figure 12, he can drag it to a private viewing area, double-click it, and read it. No other people are aware of the passed note.

### 3. Meeting Invitations and Meeting Room Keys.

Before an invitation list is compiled, the level of invitations must be specified by the invitor. Three levels of invitations are considered.

1. an invitation is for the Invitee only
2. an invitation is for the Invitee, but can be passed to a delegate, who will attend in place of the Invitee.
3. an invitation is an open invitation to anyone wishing to attend.

Invitations contain "keys" which conform to the above invitation level. Level 1 keys may not be passed to any other person and may not be copied. Level 2 keys may be passed to exactly one other person and may not be copied. If the key is returned to the original invitee than it may be passed again. Level 3 keys may be freely distributed and copied. The meeting is considered to be public.

The meeting room "knows" about each key and its invitation level. Persons with improper keys are not admitted to the room. A person without a key may be admitted to the room only by someone already in the room or by the person responsible for the room.

Invitations and keys are distributed electronically. The key is an electronic object attached to the invitation. Keys may be copied and redistributed, if permitted, or sent to another individual, if permitted. Keys may be E-mailed to persons or to positions (i.e. Operations Shift Manager) where the responsible individual will change. Confirmation of delivery and participation is provided.

**4. Meeting Room Creation.** Meeting Facilitator (or Requestor) creates meeting room on a host computer which is accessible to all invitees. The meeting room door is accessible from a hallway which has doors to other meeting rooms. Displayed on the hallway walls may be various artwork which provides a sense of location and visual reference to persons "walking the hallway". Persons may associate clusters of rooms as being "physically close". On the outside of each door is the room name, selected by the room creator. Names may reflect the nature of the room or simply provide an identity, such as the "Sales Meeting Room" or the "Einstein Room". The door may also indicate if the room is occupied, the number of occupants, their identities, whether the current meeting is open or closed and the scheduled time for the meeting(s).

Room creation includes selection of location in hallway, color of doors and walls, equipment in room (i.e. table size, flip chart, file cabinet) and meeting tools (electronic secretary, brainstorming module, on-line databases). The door lock is set to accept only the appropriate keys. The door may be set to be open (persons in the hallway may look inside and enter freely-no key needed), closed (must use a key or knock to enter), or partially open (persons in the hallway may briefly glance inside but must use a key or knock to enter).

Rooms may also have doors to committee rooms or child-rooms. Each child-room is created in the same way as the parent room and may have unique attributes (door locks, color, tools). A child room is dependent on the parent room for access, existence, etc. A person may not enter the child-room if he cannot enter the parent room. If the parent room is destroyed (see below) the child room will also be destroyed (unless steps are taken).

With respect to the above description, hallways are actually rooms with many doors, no tools and with general access to all persons. Meeting rooms are child rooms of the hallway.

**5. Entering a Room.** When a person wants to go to a room, he first enters the hallway. The user's display shows an image of a hallway with various doors to rooms. The user's entry point into the hallway may set to a default location such as the end of the hallway or to specific locations which are frequently visited. In the hallway, the user may jump to a room or may stroll the hallway. Strolling the hallway allows a user to visually locate himself in the hallway and to view the doors of the rooms as the user walks by. If the name of the room is known, the user may jump to that room by request. If the room or its location are not known or other information is desired, a user may query the hallway. Because rooms are children of the hallway it will respond with locations, number and names of occupants or other public information. Another user could be identified as being in a room who may then be "paged".

On the doors of the rooms are signs indicating the room name, if the room is occupied, the number of occupants, their identities, whether the current meeting is open or closed and the scheduled time for the meeting(s). If the door is open the user may walk in. A key is not required. If the door is partially opened he may peek inside for a brief moment. To enter the user must either knock and be invited in or place his key on the door lock icon. If the door is closed the user may not peek into the room. The user may enter the user room using his key or by knocking on the user door and be invited inside.

Knocking on a door alerts any participants inside the room to the outside user's presence. Inside the room, a user may query the room regarding the outsider's identity or ask for an image or video of outside the door.

To open a door with a key, the user drops the key onto the door lock. If the key is valid and the user has the authority to use the key, the door opens and the user is admitted to the room. The other users in the room are alerted to a new presence and receive any relevant information.

When a user enters a room with no other occupants, a data connection is made between the users computer and the host computer which stores the meeting room. The user is displayed a representation of the room in the condition it was last left. Documents may have been left on the table; drawings written on the walls. Because only one person is in the room, video and audio connections to the room are not established. If the user wishes to record and leave an audio or video message, audio or video connections may be made to the room and the message spooled to storage on the meeting room host. The connections are dropped after the message is complete.



When a user enters a room with other occupants, the data connection is made. Audio and video connections are made if supported by the user, the room and the other users. A small picture of each user is displayed in the meeting room to indicate presence. If video links are enabled then the picture may be replaced with a video signal from the user, typically showing the user. The majority of the display shows the room's table, walls, etc.

**6. Inside the Meeting Room.** Objects (documents) can be shared in the conference room by placing them on the table. This might be done by dragging an icon of the object from the outside (users non-meeting room" windows) onto the table. Ownership of the object is still maintained. If the object owner wishes, the object may be copied, borrowed by other users, or given to other users. The object may be altered (changed, annotated) by anyone with permission to do so. If the object is left in the room when the owner leaves, ownership is still retained along with rights and privileges.

Public objects may be created within the room, such as blackboard or flip chart writings, notes or drawings. Paper may be pulled from a public notepad to indicate its "group ownership". Anyone may write on the page, enlarge it, shrink it, and post it.

Object manipulation is achieved by users individually. Each user's pointer may be used simultaneously for drawing, typing, pointing, writing etc, just as many pencils may write on a single paper simultaneously. If one person removes the "paper", then no user has access to it.

The room may be used to impose discipline on the meeting procedure. For instance, Rules of Order may be used to prevent a free for all of communication. The room would require that certain procedural issues be followed before allowing a vote, identified or anonymous, to occur (another built in meeting procedure), or before someone was allowed to speak. Within the room a talking queue might be built so that only one person would speak at a time, followed by the next person and so on. An "Interest Meter" might show the interest level of the listeners to a speaker. Perhaps a thermometer type of graph would show the interest level average of each listener voting on a scale of 1-10.

**7. Adjourning the Meeting.** When a meeting is adjourned, users may leave the room and enter the hallway or they may exit the environment altogether. The data, audio and video connections are broken or maintained as appropriate. The room may be left intact or destroyed. If left intact then the room is available, along with all objects stored in the room, for the next meeting. If destroyed, then the objects are destroyed as well if not removed.

If the room is to remain after a meeting, then the objects placed on the table, in the filing cabinet or the writing on the wall remain as well. The security of the

door is reset (open, closed, partially open) by the room owner.

**8. Destroying the Meeting Room.** The room may only be destroyed by the owner. If it is to be destroyed, the room will make the owner aware of any objects which reside in the room which would be destroyed as well. The owner will have the opportunity to remove these objects from the room.

**9. Windows Context.** Much of the preceding discussion has presumed that the local computers are utilizing Windows, or an equivalent. "Windows" refers to an operating system, or "environment," which is publicly available from Microsoft Corporation, One Microsoft Way, Redmond, WA 98052-6399. Developers' packages, containing instructions and software, for writing programs which run in the Windows environment, are also available from Microsoft. However, the invention is not limited to systems utilizing these particular environments.

For example, implementation of dragging-and-dropping, double-clicking to actuate a program, or to cause an icon to bloom into a screen, etc, is within the skill of the art.

**10. Persistence of Conference Room.** The conference room itself is actually a combination of stored data and computer programs. The data can include the recorded proceedings of the conference described above.

The data and the programs need not be destroyed after termination of a conference. If they are preserved, a person having proper authorization can gain entry to the conference room and examine the proceedings of the conference. That is, both the conference room and the proceedings of the conference have persistence in time.

This persistence allows a person who did not attend the virtual conference in real time to witness it, or parts of it, afterward.

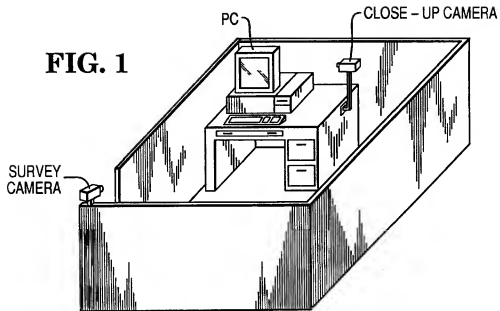
**11. Host Can Act as Moderator.** The Requestor may wish to hold a conference wherein ideas are freely exchanged among the participants. It is possible that this intent can be defeated by an aggressive person who dominates the conference, and, in effect, maintains a "filibuster."

The host can automatically prevent filibustering, in several ways. One, the host can monitor the speech of each person, and place a limit on the total time allowed to each person. The limit can be overridden by the Requestor, or by a vote taken by the host of the other participants.

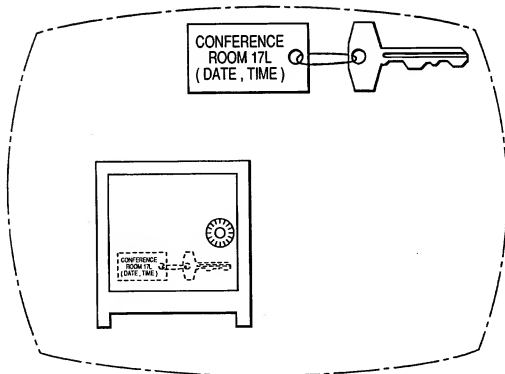
Two, while one participant is speaking, the host can monitor the audio input of the other participants. The host looks for instances when the speaker refuses to stop talking when the other participants speak. When the host finds such instances, the host issues a message to all participants stating that a filibuster appears to be occurring, and requests a vote as to whether to allow the filibuster to continue.

# Claims

1. A remote conferencing system, including a plurality of local computers, characterized by a host computer adapted to generate a common image for display by said local computers, and to allow users of the local computers to modify said common image.  
5
2. A remote conferencing system according to claim 1, characterized by audio means adapted to allow users of said local computers to speak with one another.  
10
3. A remote conferencing system according claim 1 or claim 2, characterized in that said local computers include video means adapted to allow users of said local computers to transmit video images to said host computer and in that said host computer is adapted to generate said common image based on the received video images and to transmit said common image to said local computers.  
15  
20
4. A remote conferencing system according to claim 3, characterized by modifying means adapted to allow said local computers to modify said common image.  
25
5. A remote conferencing system according to claim 4, characterized in that said modifying means include pointing devices located at said local computers and in that said common image includes respective pointers controlled respectively by said pointing devices.  
30
6. A remote conferencing system according to any one of the preceding claims, characterized by communication means adapted to permit users of two of said local computers to communicate with each other without the knowledge of users of other of said local computers.  
35  
40
7. A remote conferencing system according to any one of the preceding claims, characterized in that said local computers include respective displays adapted to display a conference icon, and in that in response to activation of said conference icon by a requester, said host computer is adapted to identify selected local computers from said plurality of local computers and to establish a communications link between the identified local computers and the requester's computer.  
45  
50  
55
8. A remote conferencing system according to claim 7, characterized in that said requester's computer is adapted to display an image of a hallway containing doors bearing the names of potential invitees and in that said host computer is adapted to control the local computers of invitees to indicate invitations to a conference.  
9
9. A remote conferencing system according to claim 8, characterized in that the images of said doors may be open, closed or ajar to indicate the status of potential invitees to invitations.  
10
10. A remote conferencing system according to any one of the preceding claims, characterized in that each local computer is associated with a close-up camera located in the vicinity of the local computer, and a survey camera located remotely from the local computer.



**FIG. 8**



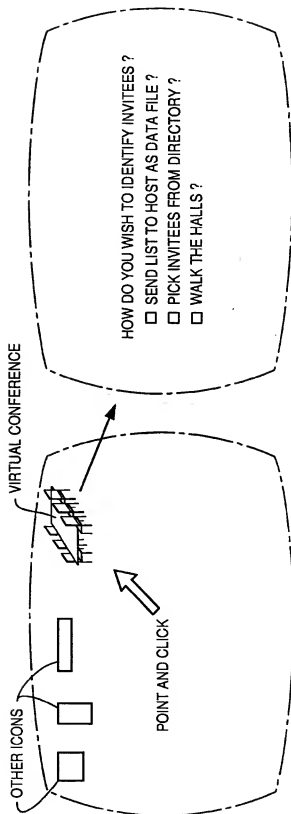
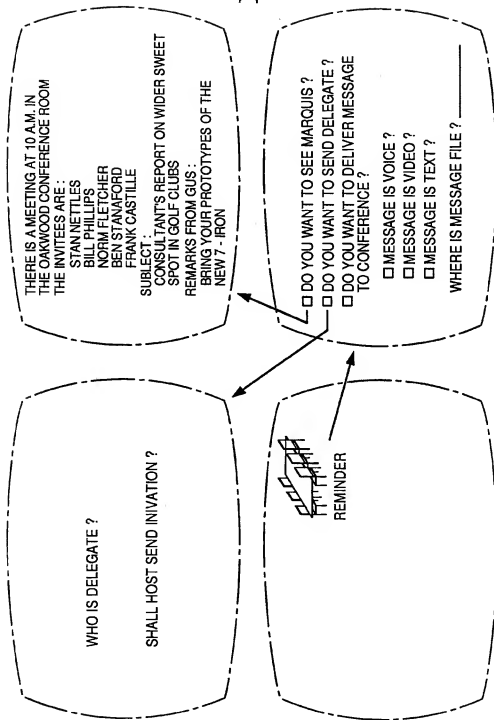
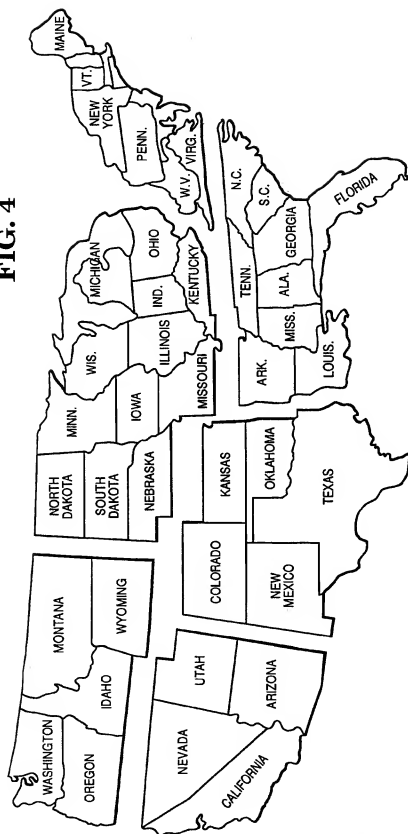
**FIG. 2**

FIG. 3



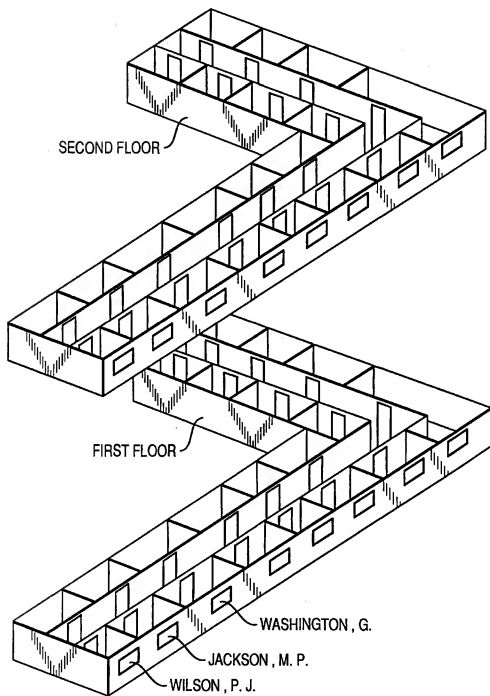
**FIG. 4**

**FIG. 5**



**FIG. 6**

COMPANY HEADQUARTERS





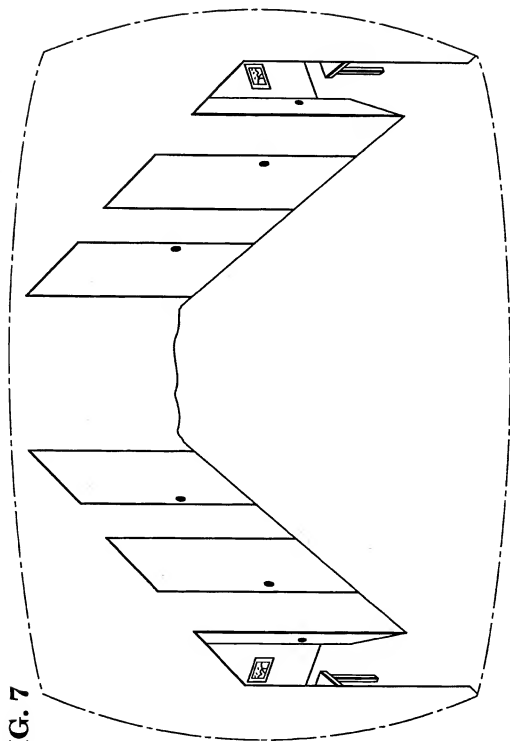
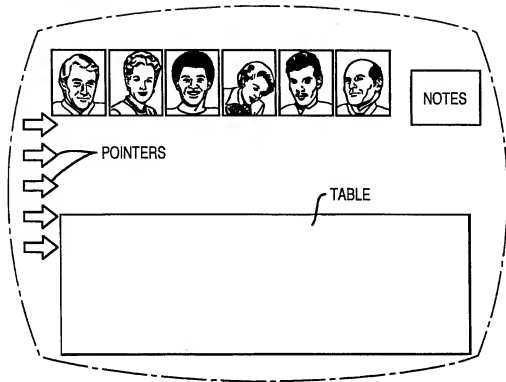
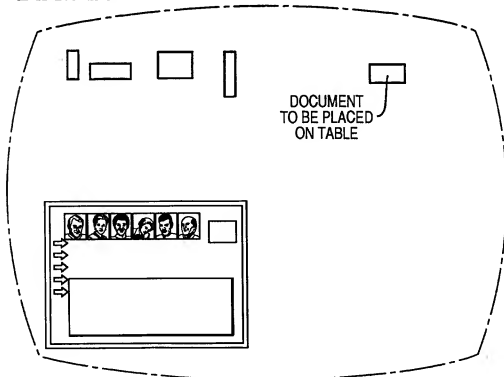


FIG. 7

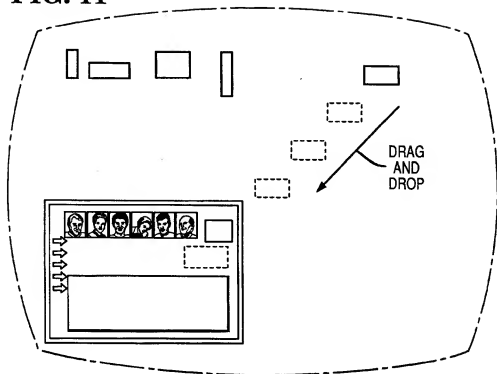
**FIG. 9**



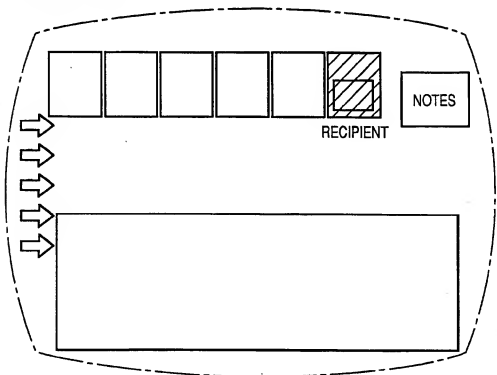
**FIG. 10**



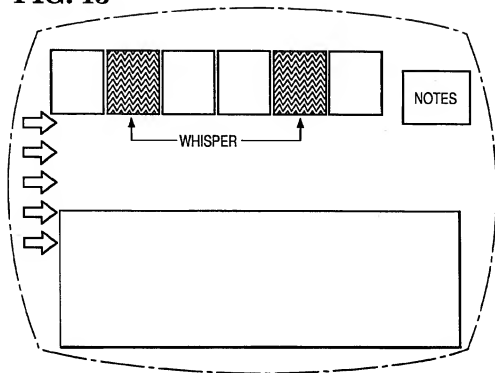
**FIG. 11**



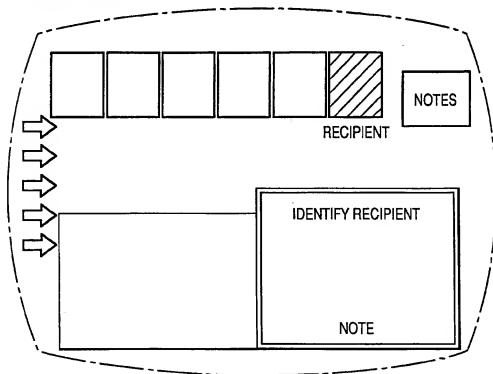
**FIG. 12**



**FIG. 13**



**FIG. 14**



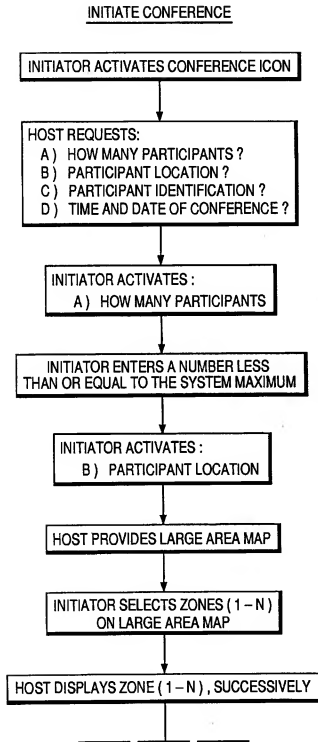
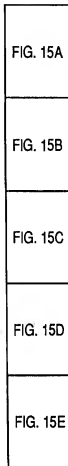
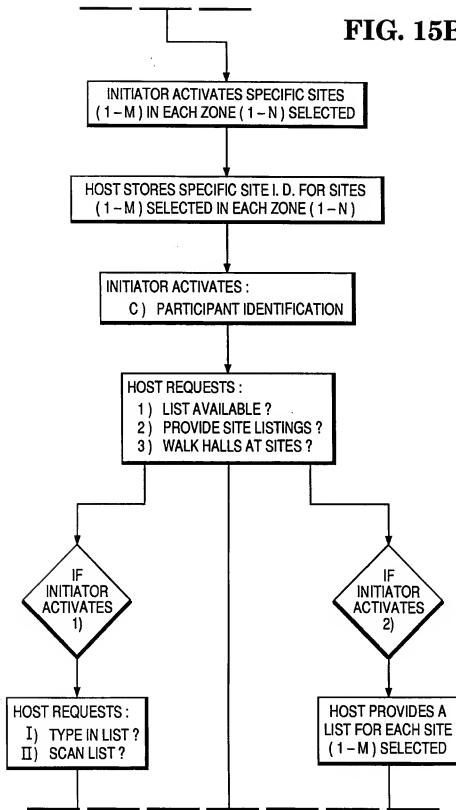
**FIG. 15A****FIG. 15**

FIG. 15B



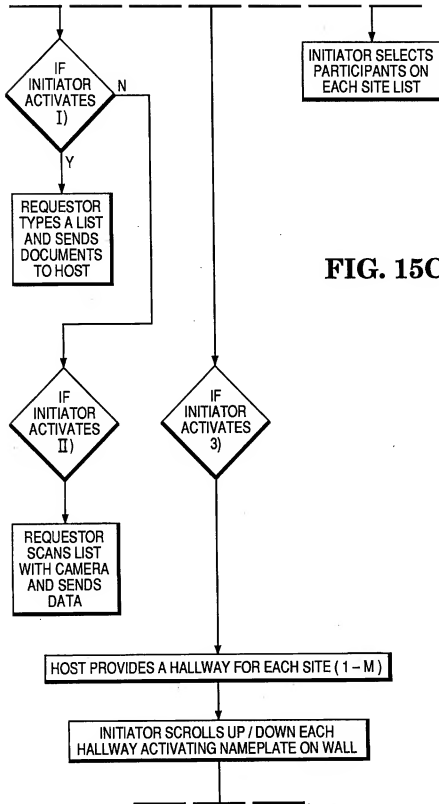


FIG. 15D

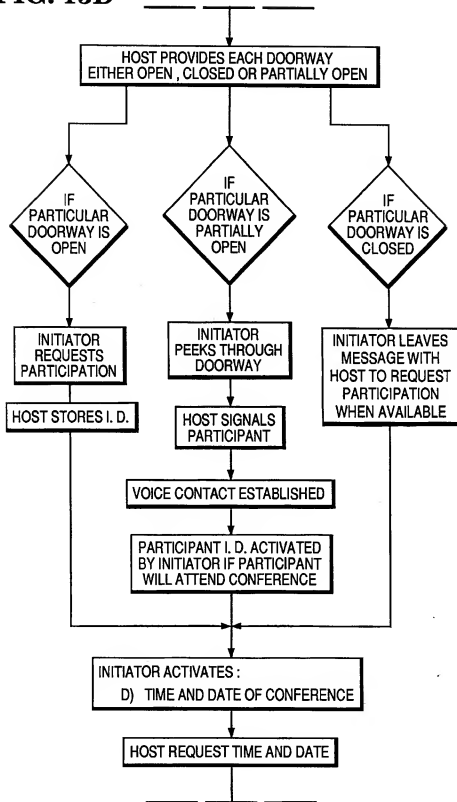
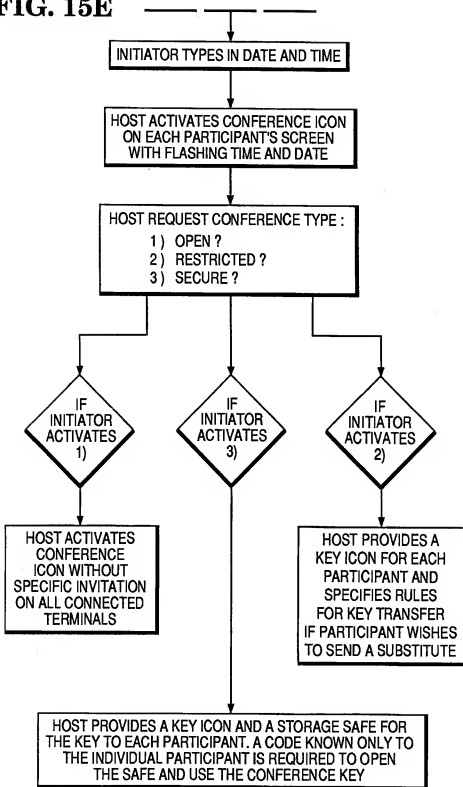
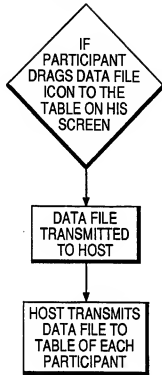
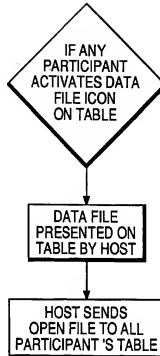
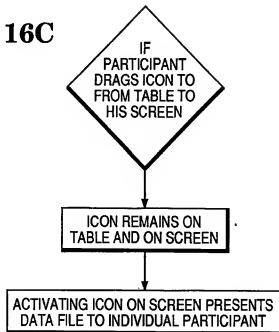
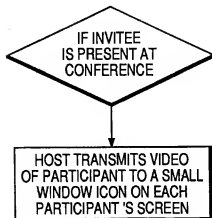
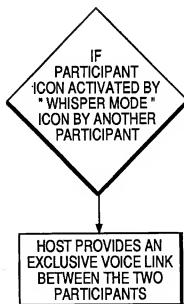
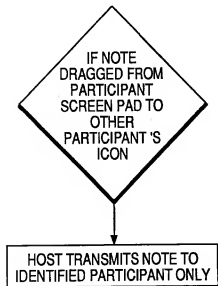




FIG. 15E

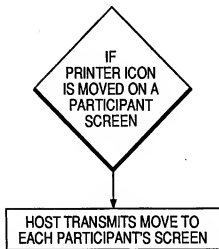


CONFERENCE ROOM**FIG. 16A****FIG. 16B****FIG. 16C**

ICON FOR PARTICIPANT**FIG. 17A****FIG. 17B****FIG. 17C**

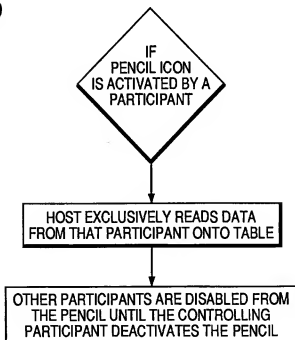
POINTER FOR PARTICIPANT

**FIG. 18**



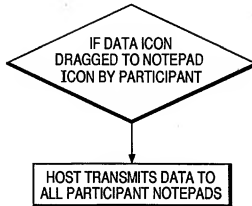
PENCIL ICON FOR WRITING

**FIG. 19**

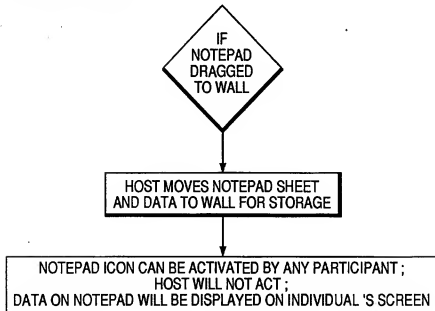


NOTEPAD ICON

**FIG. 20A**

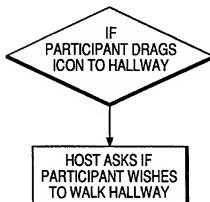


**FIG. 20B**

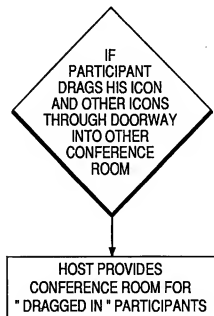


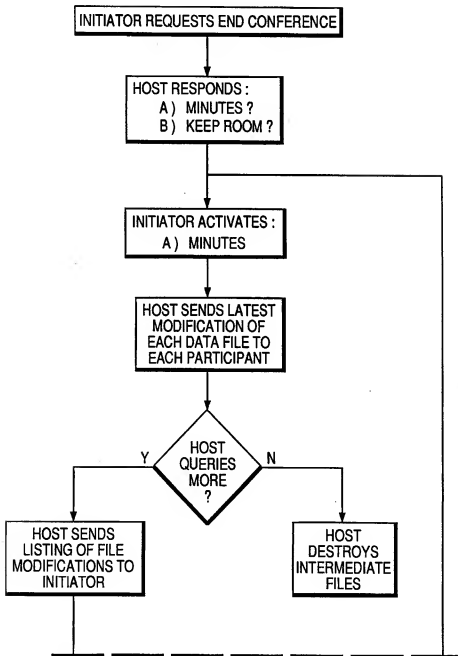
CONFERENCE ROOM DOORS

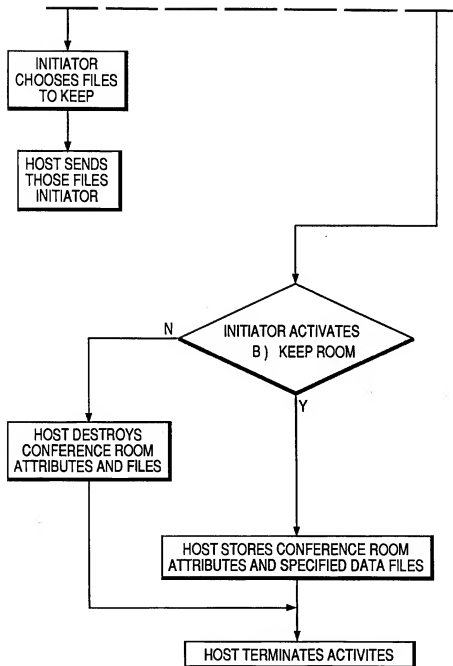
**FIG. 21A**



**FIG. 21B**



**FIG. 22A**ENDING CONFERENCE

**FIG. 22B**





European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number

EP 93 30 3688

## DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	NTZ NACHRICHTEN TECHNISCHE ZEITSCHRIFT vol. 43, no. 12, December 1990, BERLIN, DE pages 864 - 870, XP176605 ARING ET AL 'Unterstützung informeller Kommunikation innerhalb einer verteilten Gruppeneinheit' * the whole document *	1-10	H04N7/15
X	EP-A-0 410 378 (HITACHI) * the whole document *	1-6	
A	NTZ NACHRICHTEN TECHNISCHE ZEITSCHRIFT vol. 43, no. 12, December 1990, BERLIN, DE pages 872 - 878, XP176606 KORTE 'Multimedia- BK- Technik zur Unterstützung verteilter Gruppenarbeit' -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			H04N
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 AUGUST 1993	Examiner VAN DER ZAAL R.
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document</p> <p>T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons</p> <p>A: number of the same patent family, corresponding document</p>			

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